Courtenay (R. G.)

HINTS

ON THE

ECONOMICAL USE OF GAS,

ADDRESSED TO THE

GAS CONSUMERS OF LOUISVILLE

BY

ROBERT G. COURTENAY, Pres't. Louisville Gas Co.

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LOUISVILLE, KY.
C. SETTLE, PRINTER, 97 THIRD STREET.
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HINTS ON THE ECONOMICAL USE OF GAS.

To the Gas Consumers of Louisville:

I present these remarks on gas lighting, with the hope that they may cause gas consumers to think on the subject, and the information may enable them to practice more economy in the use of gas; feeling assured that greater economy in its use will not only benefit them, but also the Louisville Gas Company.

You are aware that illuminating gas is a compound of hydrogen and carbon. The hydrogen alone, although highly inflammable, would give no light; the gas owes its luminosity to the carbon. The hydrogen, when ignited, heats to an incandescent state the small particles of carbon combined with it. These particles of carbon, in passing through the flame, form so many centers for the radiation of light, when the carbon reaches the top of the flame it combines with the atmosphere and passes off in the form of carbonic acid gas. If the carbon be in excess a portion of it will pass off in smoke.

The quantity of gas that passes the burner, will always be in proportion to the size of the orifice in the burner, and the *pressure* applied to the pipe. I will endeavor to explain the meaning of this word, pressure, as here applied.

Pressure, is the initial force which propels the gas through the pipes, its degree is measured by comparing it with the height of a column of water, contained in a small bent tube, with a scale attached usually divided into inches and tenths of inches. When I say a pressure of $\frac{6}{10}$ or $\frac{15}{10}$, I mean a pressure of gas on the pipes that will support a column of water $\frac{6}{10}$ of an inch or $\frac{15}{10}$ of an inch high.

The Gas Company is obliged to maintain a higher pressure on the street pipes than many consumers require. To burn gas properly and with economy the pressure ought to be adapted to the kind of gas burner used. Some burners require a high pressure, others a low pressure. I hope to elucidate this before I close this paper. The two burners, in common use with us, are the fish-tail and bats-wing burner.

The fish-tail burner has a flat top, with two apertures at the center, close to each other, the channels of which are inclined inwards, so that both the currents of gas cross each other at the base; they then form a flat flame, spreading out in the form of an inverted triangle. This burner is *especially* adapted to burn gas at a *low pressure.* The bats-wing burner has usually a round top, with a narrow slit extending across the top, and forms a flat flame, something like a bats-wing. The bats-wing burner is a *high pressure* burner. There are many other burners, all modifications of the two kinds above described, the only one of them which I will mention is called the empire burner, this burner is essentially a fish-tail burner with an arrangement at its base to check the pressure.

Gas burners are made with apertures of different sizes; they will emit from two feet of gas to eight feet of gas per hour, and are called two feet, three feet, four feet, five feet, six feet, or eight feet burners; these sizes may be obtained of each of the kinds named. I will hereafter show the result in light, of the different kinds of burners, supplied with gas under different pressures, so as to enable you to determine the kind of burner best suited to economize gas, and particularly the effect of the different degrees of *pressure* on the light from each. I have said that gas companies have to maintain a higher pressure on their pipes than many consumers require, if the pressure were adapted to low pressure burners, on a high level, then in low ground or in cellars, the pressure would be too low to afford sufficient light with these same burners, and altogether insufficient for high pressure burners, street lamps, &c., &c. The pressure on gas pipes is found to increase $\frac{1}{10}$ inch every twelve feet of altitude, and decreases in the same ratio, with the same number of feet of depression, therefore, if there be $\frac{6}{10}$ inches pressure in the cellar of a house, there will be $\frac{10}{10}$ pressure in apartments forty-eight feet above.

I believe the fish-tail burner is best adapted for general use, and will afford the best result, but the rapid flow of gas must be checked, so that it passes from the burner at a low pressure—from $\frac{3}{10}$ to $\frac{6}{10}$ is the best pressure for these burners. When the gas passes with greater velocity, a portion of the carbon, the moment it comes in contact with the atmosphere is consumed; under a high pressure the heat and intensity of the light is increased, but the quantity, or illuminating power of the light is diminished, the velocity may be

increased until the whole flame becomes blue, then all the carbon is instantly consumed as it ignites. The same effect is produced by allowing a stream of gas to pass through wire gause, which allows the air to mingle with it before it ignites, the result is intense heat with little or no light. You will see the same effect produced by air in the gas fittings. But when gas is burned under a low pressure, less surface is exposed to the air, and a greater number of the particles of carbon are rendered luminous before being consumed. By increasing the supply of air, much of the carbon is consumed at once, without taking a solid form in the flame; more heat is then produced, and those particles which are solid in the flame are more intensely heated,—quantity of light is then sacrificed to intensity. The Empire burner checks the flow of gas by its tortuous passages, so that it reaches the tip of the burner in a proper condition for combustion. This burner requires a high pressure to produce a good effect.

The bats-wing burner never gives as much light in proportion to the consumption of gas as the fish-tail, but as it is adapted to a high pressure, in some situations it is better than the fish-tail. The best pressure for the bats-wing burner is from $\frac{10}{10}$ to $\frac{15}{10}$, and about the same pressure is required for the Empire burner. The light from a bats-wing burner may be increased from twenty-five to thirty per cent., by placing a hood, precisely like the burner in form, with a slit wider than the slit in the burner over it. This increased quantity of light is produced by diminishing the velocity of the gas before it ignites. The arrangement, however, inclines the burner to smoke a little. All burners afford the maximum quantity of light, when adjusted just at the point where, if the velocity of the gas were checked any more, the light would smoke.

Large burners give more light in proportion to the consumption of gas than small ones. The burners should be selected so as to have large burners where much gas is required, and small ones in other places.

Particular care ought to be used to turn off the cocks at the burners, when light is not required, or reduced so as to afford the required quantity, They may be turned down to a mere point, (in this state they consume very little gas,) and in a moment turned on to a full light. It frequently is convenient to have the gas brought

down, by means of a movable pendant, to the table. A small light close to you is better, for many purposes, than a large light near the ceiling, and less expensive.

Now, as much of the economy in using gas depends on properly adjusting the pressure, it is proper that I should indicate how this pressure may be controlled. When there are a small number of burners, the pressure may be adjusted by turning the cock attached to the burner. When you see the flame too high, or very much spread, or the gas appears to be moving with great velocity, the cock ought to be turned so as to arrest a portion of the gas.

All large establisments, where much light is used, would save money by procuring a regulator to regulate the pressure. The regulator may be adjusted so as to give any pressure, less than the pressure in the street pipes. With the regulator large fish-tail burners should be used, and the instrument adjusted to a low pressure, say from $\frac{3}{10}$ to $\frac{6}{10}$ at the burners. All the usual number of lights ought to be lit, and the pressure set at $\frac{4}{10}$. This pressure is to be ascertained by the gas fitter, by means of a pressure guage attached to the gas pendant, in one of the rooms on the principal floor. If this does not give light enough, increase the pressure to $\frac{6}{10}$, if still there is not enough, change the burners for larger ones, and try it again, with the pressure at $\frac{4}{10}$.

The gas fitters can procure and furnish regulators, when required. I have no doubt, in many establishments a regulator would save from 20 to 30 per cent. of the gas bills. Kidder's regulator has been some time in use, and is a good one. The past year J. H. Cooper of Philadelphia has patented a regulator, this is cheaper than Kidder's, and appears equally effective, in some respects the best, yet this new regulator has not been fully tried here.

I said I would show that some burners required a high pressure and others a low pressure. To illustrate this I have prepared a table containing the result of twenty-two photometrical experiments, with different burners, each burner under different pressures. Eleven experiments with fish-tails, commencing with a small burner, gradually increasing the size of the burner in each experiment, I commenced with a low pressure for the burner tested and gradually increased the pressure to the point at which the light is not in proportion to the gas consumed. The experiments also prove that large burners give more light in proportion to the gas consumed than small ones.

Experiment No. 2, shows, that with a small fish-tail, $5\frac{1}{2}$ feet of gas per hour only gave the light of $9.\frac{122}{1000}$ candles, while experiment No. 5, a larger burner, with the same consumption per hour, gave a light equal to $16.\frac{494}{1000}$ candles, and experiment No. 11, the largest burner with a less consumption, ($5.\frac{2}{10}$ feet per hour,) gave a light equal to $23.\frac{745}{1000}$ candles. The experiments with batwing burners show that they do not give as much light, in proportion to the gas, as the fish-tail, and large ones give more light, in proportion, than small ones.

All the results show that you obtain a much greater quantity of light from gas, by burning it under a low pressure, with a proper burner.

The best results in the table are produced by the Empire burner, which has an arrangement within itself to reduce the pressure, at a low pressure it does not produce a good effect. It must have a high pressure. The table is arranged so that one burner, under different pressures, may be compared with another, and any one may determine by its examination, the effect in light and quantity of gas consumed.

Whenever a leak occurs in the pipes or fittings a gas fitter should be called to correct it, as a large quantity of gas may be lost by a very small leak. Should a leak take place at the meter, the Gas Company, on notice left at the office will immediately repair it. If a large quantity of gas should escape, be careful not to approach the apartment with a light. Illuminating gas, when mixed with atmospheric air forms a very explosive mixture, which will explode with the force of gunpowder, when ignited. Different proportions from one part of gas to eight parts of air, to equal proportions of each form this explosive mixture. Therefore great caution ought to be taken not to allow a light to be used when there is a strong smell of gas—but at once open the windows, particuliarly the upper sash, as the mixture, being lighter than the atmosphere, will ascend to the ceiling.

EXPERIMENTS on the Illuminating power of Louisville Gas, with different Burners and Pressure, compared with Sperm Candles consuming 120 *grains per hour. Results shown by Bunson's Photometer.*

Experiment No. 1.—FISHTAIL.						
Pressure............	0.3	0.4	0.5	0.6	1.	
Consumption in feet of gas per hour......	2.	2.2	2.3	2.35	3.3	
1 foot of gas per hour equal candles......	1.251	1.555	1.705	1.662	1.262	
Quantity of light in candles.............	2.502	3.423	3.922	3.906	4.165	
Experiment No. 2.—FISHTAIL.						
Pressure............	0.3	0.5	0.6	1.	1.5	
Consumption in feet of gas per hour......	2.6	3.	3.3	4.4	5.5	
1 foot of gas per hour equal candles......	2.357	2.388	2.258	1.836	1.658	
Quantity of light in candles............	6.129	7.136	7.454	8.081	9.122	
Experiment No. 3.—FISHTAIL.						
Pressure............	0.3	0.4	0.5	0.6	0.9	1.
Consumption in feet of gas per hour......	3.	3.3	3.5	4.3	5.5	blew.
1 foot of gas per hour equal candles......	2.639	2.634	2.816	2.367	2.310	
Quantity of light in candles............	7.919	8.692	9.855	10.185	12.706	
Experiment No. 4.—FISHTAIL.						
Pressure..	0.3	0.6	1.			
Consumption in feet of gas per hour......	2.3	3.1	4.4			
1 foot of gas per hour equal candles......	2.850	2.920	2.289			
Quantity of light in candles............	6.565	9.053	9.294			
Experiment No. 5—FISHTAIL.						
Pressure............	0.4	0.6	0.9	1.		
Consumption in feet of gas per hour......	3.5	4.5	5.5	5.8		
1 foot of gas per hour equal candles......	3.172	3.286	2.999	2.757		
Quantity of light in candles............	11.102	14.788	16.494	15.899		
Experiment No. 6.—FISHTAIL.						
Pressure............	0.3	0.5	0.6	1.		
Consumption in feet of gas per hour......	2.3	2.8	3.5	4.2		
1 foot of gas per hour equal candles......	3.	3.005	3.104	2.733		
Quantity of light in candles............	6.9	8.419	10.864	11.480		
Experiment No. 7.—FISHTAIL.						
Pressure...........	0.3	0.5	0.8	1.		
Consumption in feet of gas per hour......	2.5	3.	4.	4.5		
1 foot of gas per hour equal candles......	3.011	3.250	3.176	3.134		
Quantity of light in candles............	7.529	9.750	12.706	14.104		
Experiment No. 8.—FISHTAIL.						
Pressure............	0.3	0.5	0.6	0.8	1.	
Consumption in feet of gas per hour......	2.7	3.5	3.9	4.6	5.3	
1 foot of gas per hour equal candles......	3.3	3.43	3.554	3.253	3.074	
Quantity of light in candles............	8.976	12.005	13.861	14.967	16.292	
Experiment No. 9.—FISHTAIL.						
Pressure............	0.3	0.5	0.6	0.7		
Consumption in feet of gas per hour......	4.2	5.2	5.6	blew.		
1 foot of gas per hour equal candles......	3.785	3.786	3.609			
Quantity of light in candles............	15.899	19.688	20.210			
Experiment No. 10.—FISHTAIL.						
Pressure............	0.4	0.6	0.7			
Consumption in feet of gas per hour......	4.5	5.8	6.1			
1 foot of gas per hour equal candles......	3.576	3.931	3.636			
Quantity of light in candles............	16.094	22.801	22.181			
Experiment No. 11.—FISHTAIL.						
Pressure...........	0.3	0.4	0.5			
Consumption in feet of gas per hour......	4.5	5.2	blew.			
1 foot of gas per hour equal candles......	4.103	4.566				
Quantity of light in candles............	18.462	23.745				

Experiment No. 12—Batswing.				
Pressure............	0.6	0.8	1.	1.5
Consumption in feet of gas per hour......	1.2	1.4	1.6	2.4
1 foot of gas per hour equal candles......	1.462	1.457	1.523	1.181
Quantity of light in candles............	1.755	1.968	2.437	2.835
Experiment No. 13.—Batswing.				
Pressure............	0.7	0.8	1.5	
Consumption in feet of gas per hour......	1 6	1.8	2.1	
1 foot of gas per hour equal candles......	1.357	1.354	1.844	
Quantity of light in candles............	2.172	2.437	3 873	
Experiment No. 14.—Batswing.				
Pressure............	0.6	0.8	1.	1.5
Consumption in feet of gas per hour......	1.2	1.4	1.8	2.5
1 foot of gas per hour equal candles......	2.423	2.303	2.267	2.649
Quantity of light in candles............	2 908	3.224	4.084	6.621
Experiment No. 15.—Batswing.				
Pressure............	0.5	1.	1.5	
Consumption in feet of gas per hour......	1.9	3.	4.4	
1 foot of gas per hour equal candles......	1.966	2.411	2 469	
Quantity of light in candles............	3.736	7.233	10.863	
Experiment No. 16.—Batswing.				
Pressure............	0.5	1.	1.3	
Consumption in feet of gas per hour......	2.2	3.5	4.5	
1 foot of gas per hour equal candles......	2.417	2.560	2.551	
Quantity of light in candles............	5.317	8.960	11.480	
Experiment No. 17.—Batswing.				
Pressure............	0.5	1.	1.5	
Consumption in feet of gas per hour......	2.9	5.	6.6	
1 foot of gas per hour equal candles......	2.596	2.6	3.143	
Quantity of light in candles............	7.529	13.	20.748	
Experiment No. 18.—Batswing.				
Pressure............	0.5	1.	1.3	
Consumption in feet of gas per hour......	4.2	6.2	6.5	
1 foot of gas per hour equal candles......	2.418	3.054	2.951	
Quantity of light in candles............	10.155	18.937	19.186	
Experiment No. 19.—Batswing.				
Pressure............	1.8			
Consumption in feet of gas per hour......	5.3			
1 foot of gas per hour equal candles......	2.901			
Quantity of light in candles............	15.378			
Same Burner and pressure, with Gates' hood placed on it, consumption the same.				
1 foot of gas per hour equal candles......	3.872			
Quantity of light in candles............	20.522			
Experiment No. 20.—Empire Burner.				
Pressure............	1.	1.5		
Consumption in feet of gas per hour......	2.5	3.1		
1 foot of gas per hour equal candles......	2.948	3.355		
Quantity of light in candles............	7.371	10.400		
Experiment No. 21.—Empire Burner.				
Pressure............	1.	1.5		
Consumption in feet of gas per hour......	3.	3.5		
1 foot of gas per hour equal candles......	3.320	4.175		
Quantity of light in candles............	9.960	14.614		
Experiment No. 22.—Empire Burner.				
Pressure............	1.	1.5		
Consumption in feet of gas per hour......	4.	5.0		
1 foot of gas per hour equal candles......	3.980	5.021		
Quantity of light in candles............	15.920	25.105		

Note.—The Louisville Gas is made from the best Pittsburgh Coal.

We frequently meet with persons who doubt the accuracy of the gas-meter, and who believe they have incontestable proof of its inaccuracy. One will say, my gas bill, last quarter, was very small,—I know I have burned less gas this quarter—the days have been longer, and less light used, and yet you present me with a bill for half as much more gas.

Another will say, that the meter cannot be reliable, because, during a certain quarter, his family were not at home, but little gas was consumed, yet he had to pay a large bill; the following quarter, he entertained much company—a great deal of gas was used—yet his gas bill was less than the preceding quarter.

These statements, truthfully made, do throw distrust on the meter, and require explanation. Every quarter each meter is examined, and the position of each hand on the dials noted in a book. This reading is necessarily done in a hurried manner, it is read under all circumstances; sometimes you place your head through a small opening in the floor to read it, sometimes in dark closets, and in all out of the way places. No matter how inclement the weather, the state of the meters must be taken by the first day of the month,—no matter how cold or how wet the men are, the dials of the meters must be read, and noted in their books.

On the meter there are generally three dials enclosed with a glass, each having one hand. The machinery that moves these hands is enclosed by glass and metal; the hands cannot be moved backwards or forwards, or moved at all, except by passing a gaseous fluid through the drum of the meter, and then only in a forward direction. The dial on the right hand indicates hundreds of feet; when the hand on this dial has completed its circuit, making one thousand feet, the hand on the middle dial moves one figure, and indicates one thousand feet. When the hand on the middle dial has completed its round, the hand on the left dial moves one figure, and indicates ten thousand, and thus it continues to register the gas that passes through the drum, till the left dial indicates one hundred thousand feet, when the instrument begins again at zero. All this movement is beyond the control of the Gas Company.

Now, to explain the discrepancies in gas bills above alluded to, suppose, in reading the state of the meter, for the first complainant, the man read the thousand dial *three* instead of *five*, the consumer

would pay for *two thousand* feet less than he had used; at the expiration of the next quarter, suppose he had consumed four thousand cubic feet more, this added and registered, would make the dial read nine thousand feet. From this deduct the erroneously reported state of the meter at last quarter three thousand feet, and he would be charged with six thousand feet; thus this ingenious machine corrects the error made in the last bill,—the consumer will pay for the four thousand feet used in the present quarter, and for the two thousand feet which he ought to have been charged with last quarter, and would have paid, but for the error in taking the state of the meter.

The errors are as likely to be made in favor of the consumer as against him, but if, at any subsequent quarter, the state of the meter is correctly reported, the meter corrects the error, and neither the consumer or the Gas Company is wronged. These errors do not happen more than once in a thousand bills. It is unfortunate that they happen at all—they sometimes cause ill feeling and unjust remarks—at times when the officers have not leisure to explain how these errors may occur; and sometimes the consumer will not give them an opportunity for explanation. Until men work with the unerring accuracy of a machine, these errors will happen, but they are harmless errors, in one respect, because the succeeding reading of the meter will correct the error of the eye or hand, made at last settlement.

The more fully these difficulties are explained, and the construction of the gas-meter is understood, the less likely will these unavoidable errors lead to unpleasant remarks on the settlement of gas bills.

I subjoin the following remarks on the meter, by J. N. O. Rutter, of England.

"Now, that the meter is complete in all its parts, and we have so long been familiarized with its operations, it is impossible to understand the difficulties which beset the path of its inventors, as it is to over-rate the skill that contrived, and the perseverance which completed this beautiful machine. Many changes, and many improvements have been made, both in the external form, and in the internal arrangements of the meter, since it first came out o the hands of Mr. Clegg, and was transferred to those of a man equally deserving of being remembered,—the late Saml. Crosley.

"But the principle is the same in all, whatever be the variations of form, or other details of construction, and experience has shown how admirably adapted is that principle to the work the meter has to perform. Set in motion by an impulse less powerful than the breathing of a new born infant, and discharging the duties assigned to it with the fidelity of a tried servant, and accuracy of a skillful accountant, the meter may truly be described as the offspring of genius, well instructed by philosophy. To find fault with the meter is easier than to improve it. Many persons abuse it, and almost always for its honesty. It enjoys the confidence of all who have taken pains to make themselves acquainted with its movements. If there be any who still have misgivings concerning its capabilities, let me advise them to devote only one-tenth part of the time to an examination of its merits, which they have spent in searching for defects, and all their objections will be satisfactorily answered, and their doubts entirely removed. Those who think, or speak slightingly of the gas-meter may, with great propriety, be required to tell us in what other department of trade or manufactures goods are measured, or weighed with anything approaching to the accuracy or the disinterestedness with which gas is measured. In other branches of trade, whatever may be the accuracy of the instruments, or the care of the attendants, weighing or measuring, whether in large or small quantities, are interrupted processes; and consequently there is waste, loss, and liability to error. The measuring of gas is not an interrupted process, and no attendant is required.

"The machine performs the whole of the work, and keeps a record of its own doings. Although each of the four chambers of the meter is filled in succession, they are so contrived that the current of gas flows continuously—faster or slower, as may be required,—and suffers no interruption until entirely shut off. The most vigilant observer would not be able to determine the precise moment when one chamber was full and another empty; and yet the successive filling and emptying of each chamber respectively is more perfect than in measures used for articles which are twenty thousand time more costly. Think, for a moment, of the work the meter does, and what is the value of the material it measures, comparing it bulk for bulk, with other commodities."

Take whisky at twenty cents per gallon as one example, and French brandy at four dollars per gallon as another; one thousand

cubic feet of the former costs one thousand four hundred and ninety-six dollars, and the same quantity of the latter twenty-nine thousand nine hundred and twenty-four dollars. "Neither of these articles is measured to the dealer or consumer, with anything like the accuracy of gas," which costs, in Louisville, two dollars and eighty-five cents per thousand cubic feet, or thirty-eight cents for one thousand gallons.

"The meter is not absolutely perfect; that is not to be expected of any machine. It may be as perfect as care and skill can make it: and if certain specified conditions could be always complied with, it would remain so—subject, of course, to the wear and tear of materials. But the meter is often subjected to rough treatment. Fixed in some of the most out-of-the-way places, where it is exposed to the extremes of temperature and every variety of weather, it is no wonder that its use should be attended by occasional inconveniences. For these the meter is not to be blamed. A sheltered situation, and an uniform temperature above the freezing point, are most favorable to a proper performance of its duties; and yet either from ignorance or other causes, these conditions are constantly neglected. When fixed in a warm room, the water in the meter evaporates. The machine, under such circumstances, requires occasional adjustment, or it will err in its measurement, and at last come to a stand-still. But the error, in this case, is against the Gas Company, and in favor of the consumer. More recently, a meter, constructed on a principle very different from the wet meter in ordinary use, has been received with favor. This is the dry meter; their durability and uniform accuracy, as compared with wet meters, are the only questions which remain to be settled.

"That dry meters have been made which measure gas accurately: that they will pass any given quantity, according to their size, steadily, and with such a trifling degree of resistance as to be scarcely worth noticing; that they will perform this duty when exposed to extreme changes of temperature; and that they have continued to do so, subject to the conditions of every day practice for years in succession, and without the least symptoms of failure, has been satisfactorily ascertained. So far, therefore, it is right to conclude that no practical difficulty stands in the way of the general adoption of the dry meter, but that which is common to all new inventions."

I have prepared the annexed table, showing the average number of hours in each month in the year from sunset till ten o'clock at night, with the quantity of gas that will be consumed per month by the different sized burners, if they burned these hours—In summer, it will not be necessary to light so early, but in winter, particularly in dark weather, you will have occasion for light frequently an hour before sunset, and also in the morning, which is not estimated in the table.

Table showing the consumption of gas each month in the year, from sunset to ten o'clock, burned in a $3\frac{1}{2}$, 4, 5, or 6 feet burner.

	Average hours from sunset to 10 o'clock.		Hours per month from sunset to 10 o'clock.		Cubic feet of gas consumed per month by burners burning per hour			
	Hours.	Minutes.	Hours.	Minutes.	$3\frac{1}{2}$ Feet	4 Feet.	5 Feet.	6 Feet.
January . . .	4	56	152	56	535	612	765	918
February . .	4	24	123	12	431	492	615	738
March	3	52	119	52	420	480	600	720
April	3	22	101		353	403	504	605
May	2	54	89	54	315	360	450	540
June	2	33	76	30	268	306	383	459
July	2	36	80	36	282	322	402	482
August	3	06	96	06	336	384	480	576
September .	3	52	116		406	464	580	696
October . . .	4	39	144	09	504	577	721	865
November. .	5	14	157		549	628	785	942
December. .	5	20	165	20	578	661	826	992
		Cubic feet per annum			4977	5689	7111	8533

The average of all the experiments on the illuminating power of Louisville gas, made during last year, with different burners, show that one cubic foot of gas per hour, gave a light equal to that of three and a half sperm candles, or

1000 feet of gas which costs				\$3 00
Gives light equal to			65lbs Sperm candles, @ 50.	32 50
or	"	"	78lbs of Mould tallow candles, @ $12\frac{1}{2}$. .	9 75
or	"	"	75lbs of Star candles, @ 23	17 25
or	"	"	$8\frac{7}{10}$ gallons of Sperm oil, @ \$2 50	21 75

In conclusion, this paper has been prepared on the principles of gas-lighting, with the hope that it may be beneficial to gas consumers, and enable them to light their houses at less cost.

I have prepared the photometrical table with much care, and hope it may be of practical use to gas fitters, by indicating to them the conditions under which our gas affords its full value as an illuminating agent. If they apply these principles in fitting houses—providing means for sufficient light and no more,—adapting the burner to the use that is to be made of the light in each room, and the distance the light has to be cast from its source, remembering that the number of rays of light from any source is inversely as the square of the distance from the source:—If the light of three candles is sufficient four feet from you, it will require twelve candles at the distance of eight feet, to produce the same light,—and they put up their fittings in a workmanlike manner, there will be less complaint of high gas bills and consumers will realize that there is no light so cheap or so convenient as gas light.

Office Louisville Gas Company, February 20, 1858.